



# Seamless-PV

## D3.2 Flexible tabber-stringer compatible with new cell formats, Zebra technology and ECA-based tabber stringer compatible with black ribbon technology, complying with specifications

Task 3.2. Flexible tabber-stringer for mono and polycrystalline cell interconnection of upcoming cell formats.

Task 3.3. Flexible tabber-stringers for Zebra-cell technology interconnection with enhanced flexibility



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**Project funded by**



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,  
Education and Research EAER  
**State Secretariat for Education,  
Research and Innovation SERI**

## Document control sheet

**Project** SEAMLESS-PV – Development of advanced manufacturing equipment and processes aimed at the seamless integration of multifunctional PV solutions, enabling the deployment of IPV sectors

|                            |                                                                                                                                                                                                                           |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Topic identifier</b>    | HORIZON-CL5-2022-D3-01-03                                                                                                                                                                                                 |
| <b>Grant Agreement N°</b>  | 101096126                                                                                                                                                                                                                 |
| <b>Coordinator</b>         | Fundación Tecnalia Research and Innovation (TEC)                                                                                                                                                                          |
| <b>Duration</b>            | 01/01/2023 – 31/12/2026                                                                                                                                                                                                   |
| <b>Work package</b>        | WP3 – Highly flexible and automated IPV manufacturing                                                                                                                                                                     |
| <b>Work package leader</b> | Mondragon Assembly (MASS)                                                                                                                                                                                                 |
| <b>Tasks</b>               | Task 3.2. Flexible tabber-stringer for mono and polycrystalline cell interconnection of upcoming cell formats.<br>Task 3.3. Flexible tabber-stringers for Zebra-cell technology interconnection with enhanced flexibility |
| <b>Task leader</b>         | Mondragon Assembly (MASS)                                                                                                                                                                                                 |
| <b>Document title</b>      | D3.2_Flexible tabber-stringer compatible with new cell formats, Zebra technology and ECA-based tabber stringer compatible with black ribbon technology, complying with specifications                                     |
| <b>Document Ref</b>        | SEAMLESS-PV-D3.2_ Flexible tabber-stringer-v1.0.docx                                                                                                                                                                      |
| <b>Lead Beneficiary</b>    | Mondragon Assembly (MASS)                                                                                                                                                                                                 |
| <b>Dissemination level</b> | public (PU)                                                                                                                                                                                                               |
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| <b>Reviewer(s)</b>         | Javier del Pozo (TEC)                                                                                                                                                                                                     |
| <b>Due date</b>            | 31/12/2024 (M24)                                                                                                                                                                                                          |
| <b>Submission date</b>     | 28/02/2025 (M26)                                                                                                                                                                                                          |

**History of versions**

| <b>Versi<br/>on</b> | Date       | Author - Beneficiary  | Approved by     | Comments                          |
|---------------------|------------|-----------------------|-----------------|-----------------------------------|
| <b>v00</b>          | 19/02/2025 | Antonio Valor-MASS    | Antonio Valor   | Final draft.<br>prepared by MASS. |
| <b>V01</b>          | 28/02/2025 | Javier del Pozo - TEC | Daniel Valencia | Reviewed                          |

## SEAMLESS-PV PROJECT

### A novel manufacturing process for integrated photovoltaics

Integrated photovoltaics (IPVs) have demonstrated their success and impact in their use as building-integrated photovoltaics. They are also considered promising in several other sectors. Their adaptation to other industries or devices could offer surprising benefits. Unfortunately, the very need for adaptable IPV solutions hinders their expansion as their current manufacturing processes cannot create IPV solutions customised to each sector. The EU-funded SEAMLESS-PV project aims to tackle this by developing revolutionary tools for photovoltaic manufacturing as well as new IPV products that offer improved efficiency, adaptability and integrability while at the same time showcasing their cost-effectiveness in comparison to competitors.

The title of SEAMLESS-PV project is *“Development of advanced manufacturing equipment and processes aimed at the seamless integration of multifunctional PV solutions, enabling the deployment of IPV sectors”*. SEAMLESS-PV is a Horizon Europe Innovation Action started in January 2023 that will continue through December 2026.

More information can be found at:

<https://www.seamlesspv.eu/>

<https://cordis.europa.eu/project/id/101096126>

## EXECUTIVE SUMMARY

This deliverable D3.2 explains the process carried out for the manufacturing of two different machines:

- 1- Flexible tabber-stringer for mono and polycrystalline cell interconnection of upcoming cell formats.
- 2- Flexible tabber-stringers for Zebra-cell technology interconnection with enhanced flexibility.

In this deliverable, the machines are shown from a functional point of view, visually showing the different positions that make up the machines, so that the machines and how they work can be understood.

## Acknowledgements

The work described in this publication has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N° 101096126.

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## Project partners

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## Index

|                                                                                                                    |           |
|--------------------------------------------------------------------------------------------------------------------|-----------|
| Document control sheet .....                                                                                       | ii        |
| Acknowledgements .....                                                                                             | vi        |
| Disclaimer .....                                                                                                   | vi        |
| Project partners .....                                                                                             | vi        |
| <br>                                                                                                               |           |
| <b>1 INTRODUCTION .....</b>                                                                                        | <b>1</b>  |
| 1.1 Description of the deliverable content and purpose .....                                                       | 1         |
| 1.2 Relation with other activities in the project .....                                                            | 1         |
| 1.3 List of abbreviations .....                                                                                    | 1         |
| <br>                                                                                                               |           |
| <b>2 Flexible tabber-stringer for mono and polycrystalline cell interconnection of upcoming cell formats. ....</b> | <b>2</b>  |
| 2.1 Complete machine .....                                                                                         | 2         |
| 2.2 Ribbon feed control .....                                                                                      | 2         |
| 2.3 Cell feeder (M10 full or half) .....                                                                           | 3         |
| 2.4 Cell position control by camera .....                                                                          | 3         |
| 2.5 Ribbon dispenser-placer with innovative system that allows different lengths between cells .....               | 4         |
| 2.6 Welding (using a process developed for this machine) .....                                                     | 4         |
| 2.7 String cutting .....                                                                                           | 5         |
| 2.8 String finished .....                                                                                          | 5         |
| <br>                                                                                                               |           |
| <b>3 Flexible tabber-stringer for Zebra-cell technology interconnection with enhanced flexibility .....</b>        | <b>6</b>  |
| 3.1 Complete machine .....                                                                                         | 6         |
| 3.2 Ribbon feed control .....                                                                                      | 6         |
| 3.3 Cell feeder (Zebra M6 half) .....                                                                              | 7         |
| 3.4 Cell position control by camera .....                                                                          | 7         |
| 3.5 ECA dispensing .....                                                                                           | 8         |
| 3.6 Ribbon dispenser-placer with innovative system that allows different lengths between cells .....               | 8         |
| 3.7 Welding (using a process developed for this machine) .....                                                     | 9         |
| 3.8 String cutting .....                                                                                           | 9         |
| <br>                                                                                                               |           |
| <b>4 Summary .....</b>                                                                                             | <b>10</b> |

## Tables

|                                                                                           |   |
|-------------------------------------------------------------------------------------------|---|
| Table 1.1: Relation between current deliverable and other activities in the project ..... | 1 |
| Table 1.2: List of abbreviations .....                                                    | 1 |

## Figures

|                                                                                   |   |
|-----------------------------------------------------------------------------------|---|
| Figure 2.1: Complete tabber-stringer.....                                         | 2 |
| Figure 2.2: Ribbon feed configuration.....                                        | 2 |
| Figure 2.3: Cells feeder.....                                                     | 3 |
| Figure 2.4: Cell position control by camera.....                                  | 3 |
| Figure 2.5: Ribbon dispenser & placer for string.....                             | 4 |
| Figure 2.6: Welding area.....                                                     | 4 |
| Figure 2.7: String cutting station.....                                           | 5 |
| Figure 2.8: String samples, 1x Standard mode+ 2 X BIPV mode.....                  | 5 |
| Figure 3.1: Complete tabber-stringer.....                                         | 6 |
| Figure 3.2: Ribbon feed configuration.....                                        | 6 |
| Figure 3.3: Cells feeder.....                                                     | 7 |
| Figure 3.4: Cell position control by camera.....                                  | 7 |
| Figure 3.5: New ECA dispensing system.....                                        | 8 |
| Figure 3.6: Ribbon dispenser-placer for string designed for SEAMLESS-PV T3.3..... | 8 |
| Figure 3.7: Welding (process developed for Zebra+ECA) .....                       | 9 |
| Figure 3.8: String cutting station.....                                           | 9 |

# 1 INTRODUCTION

## 1.1 Description of the deliverable content and purpose

MASS has experience in previous projects in manufacturing tabber-stringers with extra capacities respect to the ones defined as standard, for example the tabber-stringer developed in the BIPVBoost project. Within the SEAMLESS-PV project, the development goes one step further in giving extra specifications to the tabber-stringer, thus manufacturing two tabber-stringers with extra capacities to what the current market offers.

In this DEMO type deliverable, the two machines developed within tasks T3.2 and T3.3 of the SEAMLESS-PV project are shown graphically. These machines are:

- 1- Flexible tabber-stringer for mono and polycrystalline cell interconnection of upcoming cell formats.
- 2- Flexible tabber-stringers for Zebra-cell technology interconnection with enhanced flexibility

Both processes and functionalities of the machines will be described in greater detail in D3.5.

## 1.2 Relation with other activities in the project

Table 1.1 depicts the main links of this deliverable to other activities (work packages, tasks, deliverables, etc.) within SEAMLESS project. The table should be considered along with the current document for further understanding of the deliverable contents and purpose.

Table 1.1: Relation between current deliverable and other activities in the project

| Project activity | Relation with current deliverable                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------|
| T3.1             | For the manufacturing of the tabber-stringer, the specifications defined in D3.1 have been taken into account. |

## 1.3 List of abbreviations

Table 1.2: List of abbreviations

| Acronyms | Meaning                           |
|----------|-----------------------------------|
| BIPV     | Building Integrated Photovoltaics |
| ECA      | Electrically Conductive Adhesive  |

## 2 Flexible tabber-stringer for mono and polycrystalline cell interconnection of upcoming cell formats.

This tabber-stringer can work in two different modes with mono and polycrystalline cells:

1. Standard mode: Mode with constant distance between cells.
2. BIPV mode: Mode with variable distance between cells between 2 and 200 mm

### 2.1 Complete machine



Figure 2.1: Complete tabber-stringer.

### 2.2 Ribbon feed control



Figure 2.2: Ribbon feed configuration.

## 2.3 Cell feeder (M10 full or half)

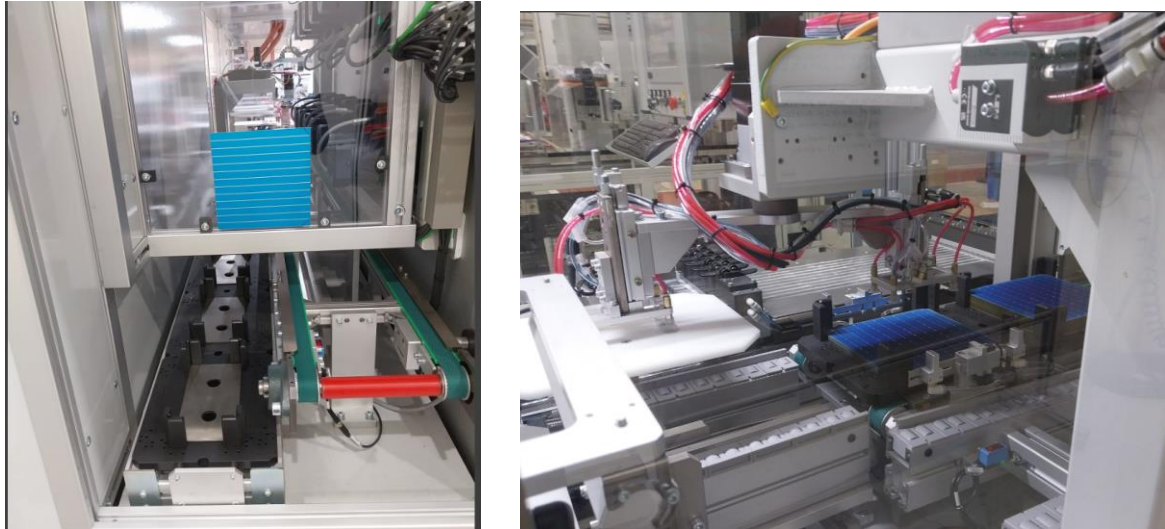


Figure 2.3: Cells feeder.

## 2.4 Cell position control by camera

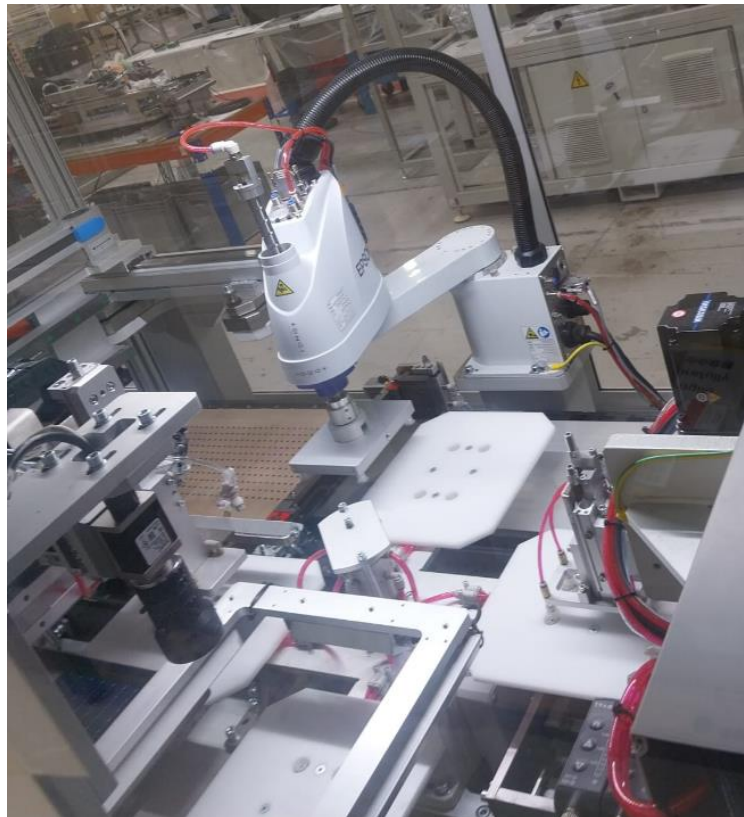


Figure 2.4: Cell position control by camera.

## 2.5 Ribbon dispenser-placer with innovative system that allows different lengths between cells

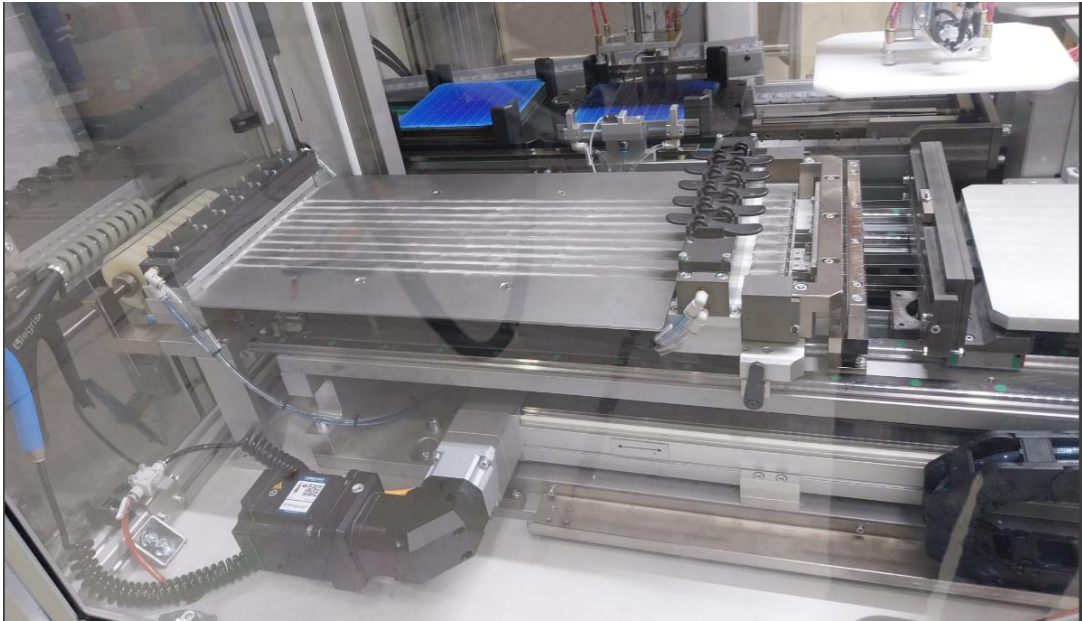


Figure 2.5: Ribbon dispenser & placer for string.

## 2.6 Welding (using a process developed for this machine)

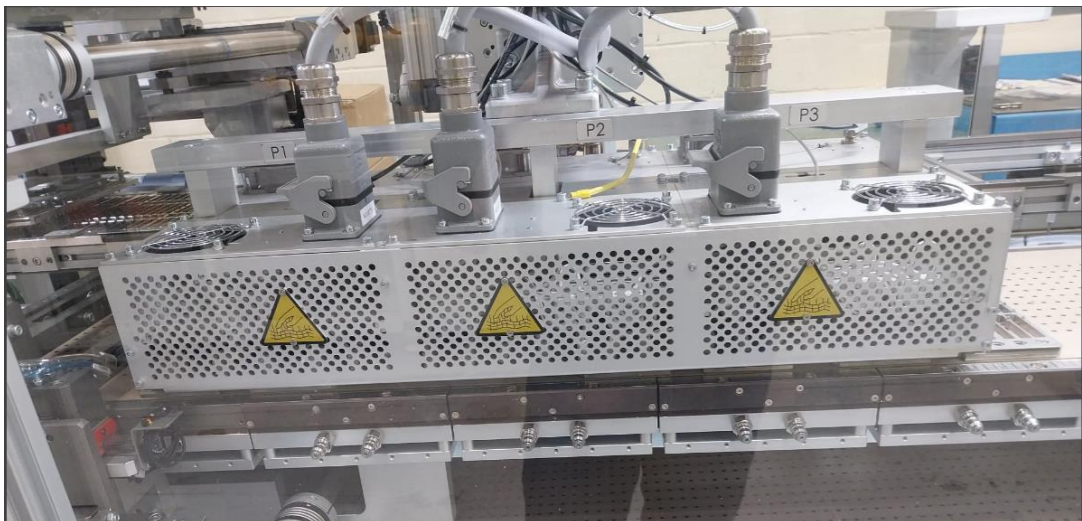


Figure 2.6: Welding area.

## 2.7 String cutting



Figure 2.7: String cutting station.

## 2.8 String finished



Figure 2.8: String samples, 1x Standard mode+ 2 X BIPV mode.

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D3.2\_Flexible tabber-stringer compatible with new cell formats, Zebra technology and ECA-based tabber stringer compatible with black ribbon technology, complying with specifications

### 3 Flexible tabber-stringer for Zebra-cell technology interconnection with enhanced flexibility

In this tabber-stringer, strings will be manufactured using Zebra Cells by using ECA for the ribbon-cell bond.

#### 3.1 Complete machine



Figure 3.1: Complete tabber-stringer.

#### 3.2 Ribbon feed control



Figure 3.2: Ribbon feed configuration.

### 3.3 Cell feeder (Zebra M6 half)



Figure 3.3: Cells feeder.

### 3.4 Cell position control by camera

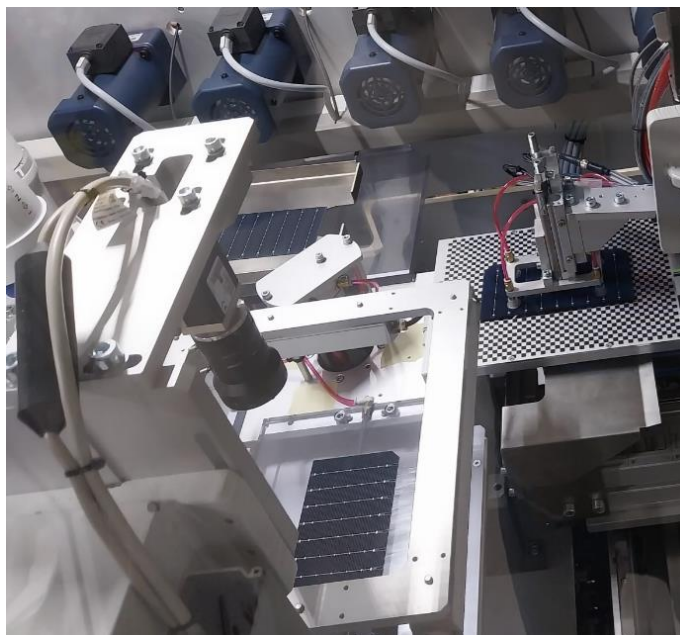


Figure 3.4: Cell position control by camera.

### 3.5 ECA dispensing system

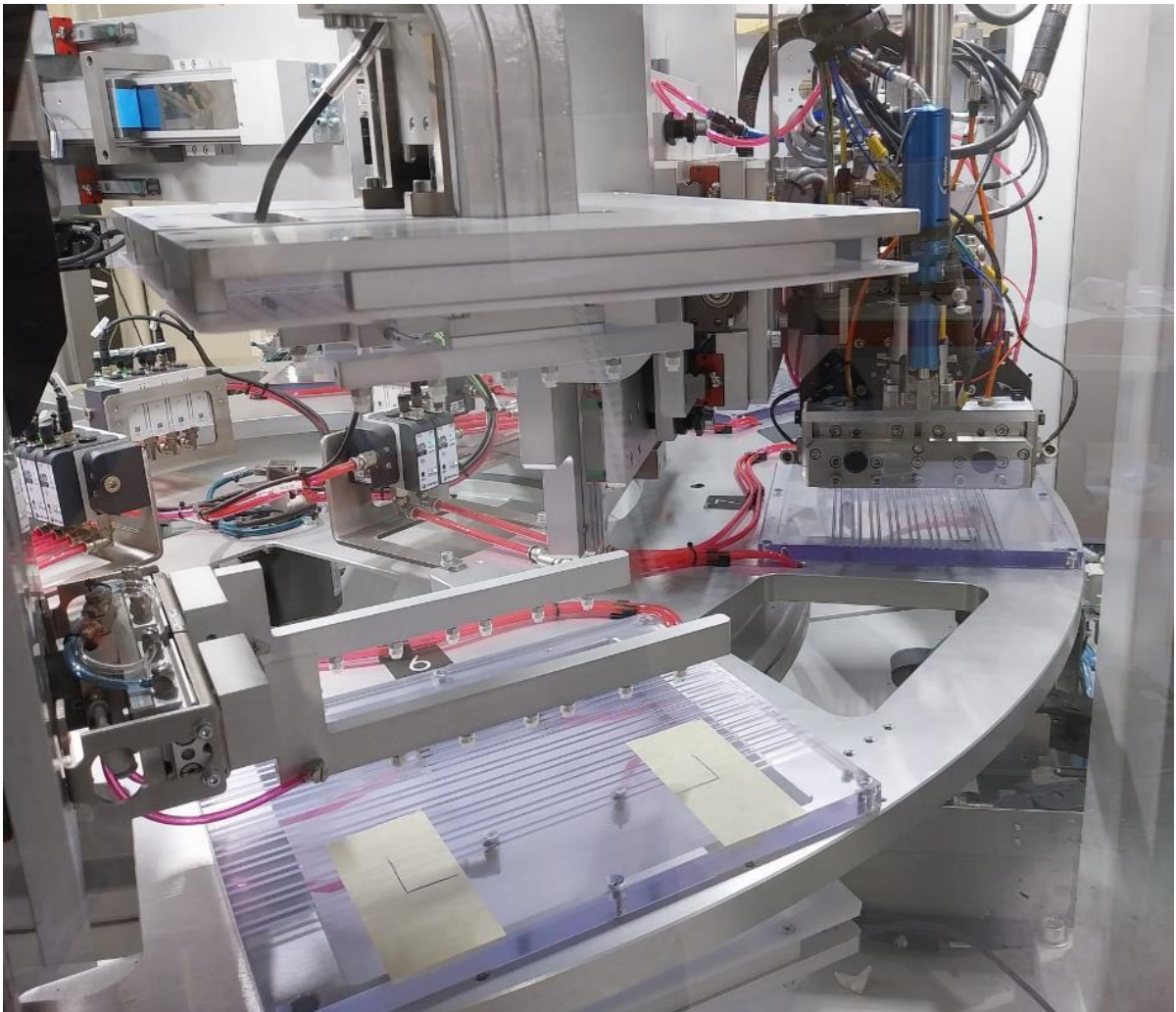


Figure 3.5: New ECA dispensing system.

### 3.6 Ribbon dispenser-placer with innovative system that allows different lengths between cells

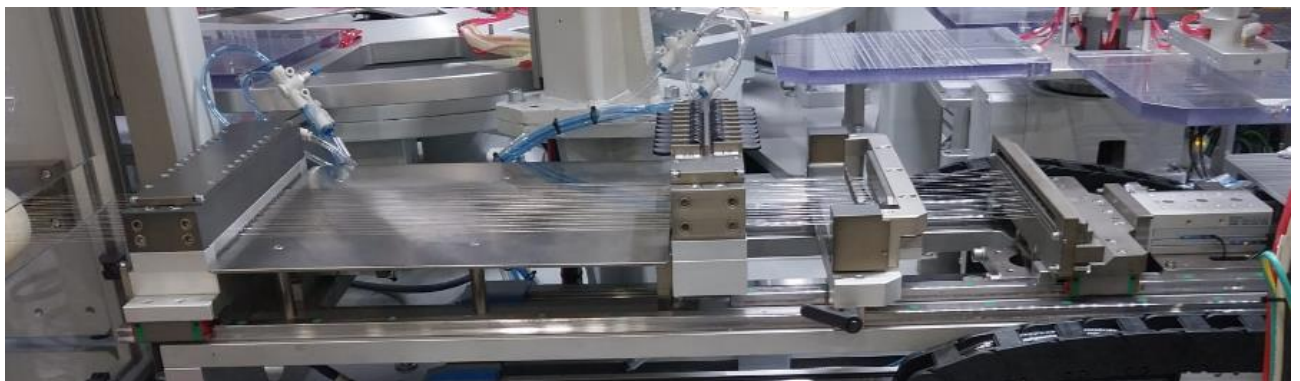


Figure 3.6: Ribbon dispenser-placer for string designed for SEAMLESS-PV T3.3.

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D3.2\_Flexible tabber-stringer compatible with new cell formats, Zebra technology and ECA-based tabber stringer compatible with black ribbon technology, complying with specifications

### 3.7 Welding (using a process developed for this machine)

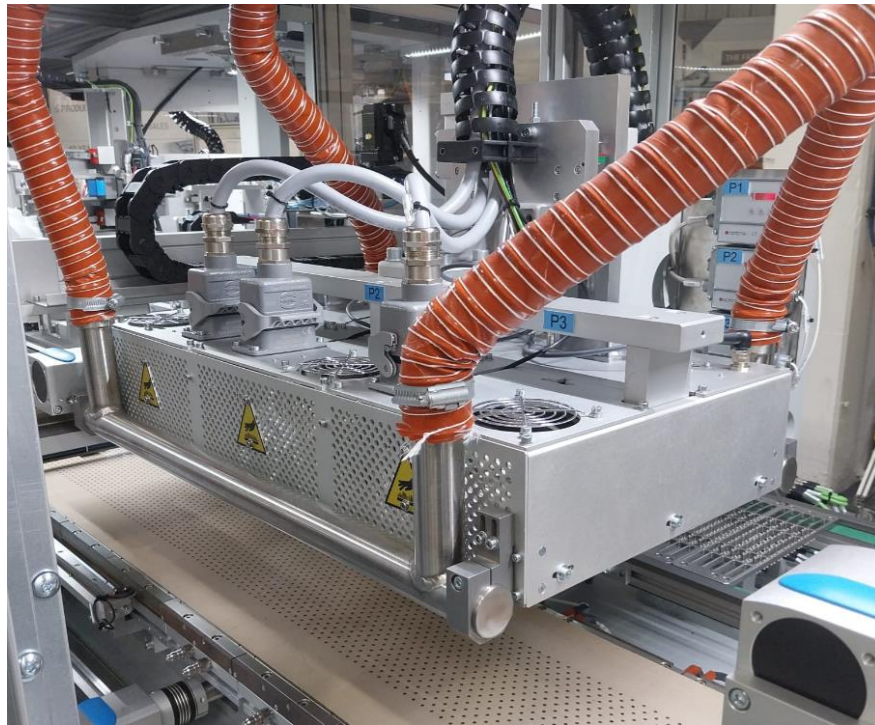


Figure 3.7: Welding (process developed for Zebra+ECA)

### 3.8 String cutting



Figure 3.8: String cutting station.

## 4 Summary

This deliverable graphically shows the work carried out to manufacture the machines defined in tasks T3.2 and T3.3 of the SEAMLESS-PV project.



# Seamless-PV



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